

Improving Project Team Learning in Major Projects – A Case Study Comparison

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Abstract

The need to effectively manage projects and to learn from one project to another is crucial for project based-organizations. Despite the agreement among scholars and practitioners on the importance of learning from projects as a way to improve performance, we continue to see practices on projects contrary to what learning is all about. As a result, mistakes are being repeated on projects and lessons are clearly not learnt. Through an in-depth case study research, the author in this paper looked at the dynamics of project learning and the learning process within project teams. Two major power transmission projects were investigated. The study identified real barriers and challenges to project team learning in the power transmission & distribution industry. Comparative analysis was made to highlight differences and similarities between the two cases. Finally a framework for project team learning improvement was presented at the end of the study that should guide project-based organizations seeking to embark on lessons-learned initiatives.

Dixon (2000, p.41) defines learning as “the process of interpreting what we experience in the world”. Alternatively, Kolb (1984, p.38) simply defines learning as “the processes whereby knowledge is created through the transformation of experience.” On the other hand, Senge (1990, p.49) defined learning in an organization as: “the continuous testing of experience and the transformation of that experience into knowledge that is accessible to the whole organization and relevant to its core purposes.

Kerzner places continuous learning and improvement as the highest level of project management maturity in an organization, he states that: “without discounted lessons learned, a company can quickly revert from maturity to immaturity in project management” Kerzner H (2000). Without learning knowledge is lost and past mistakes are repeated. Kerzner points to the use of simple methods such as lessons-learned files and lessons learned case studies. Moreover, Cooke-Davis based on a major empirical study, found that one of the 12 key success factors in project oriented organizations is the ability to learn from experience on projects in a way that combines explicit knowledge with tacit knowledge to encourage people to learn and to embed that learning into continuous improvement of project management processes and practices. Cooke-Davies (2002).

With a few exceptions, it appears that project reviews are infrequently performed and useful lessons are not effectively captured. Once lessons-learned are captured, it needs to be incorporated into the processes and policies of our organizations. A “lessons-learned” process needs to be implemented and then reflected upon to produce “double loop learning”. Therefore, the need to consider what is best practice in reviewing projects is evident. Collison & Parcel (2001).

Learning clearly happens to some extent by the very nature of undertaking projects. Schofield and Wilson (1995), for example, looked at capital projects within the UK National Health Service and observed that learning did happen in three ways (mechanical, cognitive and behavioral). Ayas (1998) also argues that ‘learning within projects does not happen naturally, it is a complex process that needs to be managed.’ It requires deliberate attention, commitment and continuous investment of resources. Ayas (1998).

Ayas and Zeniuk (2001) discuss promoting projects as learning vehicles and developing communities of practice. Similarly, Sense (2003) discusses embryonic communities of practice as they provide an opportunity to learn if their focus is shifted to include learning. Sense (2003). Arthur, Defillippi and Jones (2001) also looked at project-based learning, and classified project success based on project performance and learning.

According to Sense, “There is an extremely limited and shallow coverage of learning and its challenges within project team environments.” (Sense, 2007, p. 405). To highlight the problem and current gap in the literature in project team learning, Sense (2004) emphasize on the importance of reaching a better understanding of the learning process within project teams, by focusing on the individual and organizational aspects of learning, and how organizations could improve an individual’s skills to become creative and achieve organizational goals.

There is also a problem with the existing views on project learning in the literature. Although the literature about learning emphasizes the potential for learning in projects, it also highlights the difficulty in archiving that learning (Ayas and Zeniuk, 2001). While there may be a significant amount of learning happening within a project, this can be difficult to capture and share across projects (i.e. from one project to another), or between the project and the wider organization (Prencipe and Tell, 2001).

To cover this gap in the knowledge and in order to understand the learning phenomenon in the context of real projects, the author selected two major projects in the power transmission industry to undertake a detailed investigation of learning practices associated with these projects. In this paper the author will present key findings of two case studies conducted on two major power transmission projects in Canada. The goal of this research study was to develop better understanding of the real barriers and challenges of project team learning and propose a theoretical framework in order to facilitate the learning process in major projects.

Research Methodology

The selection of the most appropriate research methodology is essential in order to collect meaningful data and obtain desirable results. The author examined several quantitative and qualitative research methods in order to select the most appropriate method for the purpose of this study. Due to the nature of the topic of learning and the objectives of this research in addition to lack of existing empirical work and related literature on this topic. It was concluded that case studies would be the most suitable method to investigate and understand issues associated with the learning process in major projects.

In order to understand the real barriers and challenges associated with learning in major projects, the author selected case studies as a research methodology to acquire relevant data on project team learning. The selection of case studies was based on the understanding that very little information is available on project team learning and the phenomenon is largely undiscovered. In addition, there are very few empirical studies completed on this topic. The use of case studies will help to investigate in-depth issues related to individual and group aspects of learning in major projects. It will also help to understand the real context of the challenges associated with project learning.

Based on the above, a major engineering company in the field of transmission and distribution of power was approached as it was currently undertaking two major transmission projects in Canada (projects A & B). A study proposal was submitted to senior management of this company and the client organization requesting approval. Permission was granted based on the realization of the contribution of the study and the importance of the results and findings that could emerge from this study.

Discussion

Case Study A

Project A was based on one project as part of a major program of projects aimed at developing the transmission system in Western Canada. The program consists of several projects to be executed over a 10 year timeframe. The scope of this program includes upgrade and expansion of existing electrical substations, building new substations and constructing new high voltage transmission lines. The scope also included upgrading all the telecommunication equipment in existing substations. The program original budget was approximately \$ 4 billion CAD.

Phase One of this program was the first case study in the research, Case study A, and this included three main power substations. The scope of work included engineering, procurement, construction & commissioning of the project to change the operating voltage of the existing transmission circuit between the three substations from 240 kV to 500 kV, and the associated upgrades to two of the three substations. The upgrade of the substations included changing the protection and control equipment in both substations. The transmission lines connected to both substations needed to be brought up to 500kV from the existing 240kV capacity. This project started in January 2006 and was completed March 2009. The project had an original budget of \$55 million.

The case study was completed using document reviews and semi-structured interviews conducted with the two project teams. Relevant project documentation were gathered and analyzed to understand problems associated with cost overrun on the project and the learning resulted from it. Project documents review included: monthly progress reports, minutes of meetings, change notices, extra work orders, financial records, etc. In addition, individual interviews were conducted with the team. The purpose of such interviews was to understand how learning is impacted on major projects and how we can improve the learning process. Project team members from a variety of backgrounds and the major functional departments: engineering, procurement, construction and project management were contacted to participate in this study. The sample included people with different levels of experience and on different roles on the

project which helped to enrich the results as it represents a variety of opinions and perspectives. It was very difficult to convince project team members to participate in these interviews due to their numerous project commitments and heavy workloads. Ultimately 19 interviews were conducted with various project team members. At this point saturation was reached as no new ideas or concepts emerged from the final interviews. The combined findings from all interview transcripts were coded to identify and extract themes and patterns in order to make clear observations and draw valid conclusions.

Case Study B

Project B is a high voltage 240kV transmission project aimed at developing the transmission and substation facilities in western Canada. The scope of work required to engineer, procure, construct & commission numerous stations and transmission line improvements to accommodate the overall transmission system development. The work will be constructed in three different substations in addition to connecting the three substations with a major 240kV transmission line. The project original budget was \$ 65 Million. The project started in January 2006 and is still ongoing until this date. The project expected final cost is \$ 120 Million.

After analyzing the results of the initial interviews, the author noticed new concepts and themes that emerged and need further investigation. It was then decided that additional supplementary interviews should be conducted to investigate these issues. Additional seven supplementary interviews were completed on project A and five supplementary interviews on project B. After completing the supplementary interviews the author noticed a pattern of repeated concepts, themes and constructs. It was then decided that saturation has been reached and no further data collection will be necessary.

Key Aspects of Learning in Project Teams

The analysis of the two cases separately indicated that there were common concepts and themes between the two cases that were used as a basis for the analysis. However, there were differences in some instances between the two cases in terms of learning barriers that exist on the project and the suggested strategies and actions to be taken by the team to avoid repeated mistakes and improve project team learning. Following is a comparative analysis of results obtained on the two cases in terms of the key learning issues identified:

A) Learning Barriers

Crucial to the understanding of the learning phenomena, is to understand the barriers associated with learning and to know what could prevent learning from evolving and prospering on major projects. What are the challenges that face project teams in improving their learning capabilities both as individuals as well as groups working together to accomplish the project and achieve the desired success.

During the analysis process, it was noticed that similar codes were noted between the two cases representing the main themes/ concepts emerged from the analysis. These codes represent the major issues related to learning barriers, those as noted are: reluctance to share, training and

mentorship, cultural and language barriers, high turnover and lack of communication. Following are the main barriers identified from the two case studies.

- Reluctance to share: although this was noted on both projects, it was identified in the interviews that this reluctance is unintentional and that people are generally cooperative and willing to share information and learning. However, on project A it was mostly the lack of time and insufficient project meetings to enable sharing and communication of lessons-learned or project related information that prevented this sharing from happening. On project B, the team even considered sharing to be an additional work that is not generally required and not part of the job requirement, so people try normally to avoid sharing unless specifically requested to do so.
- Training & mentorship: both project teams agreed that there is lack of training and mentorship in the organization, mainly attributed to lack of time and busy senior people who can't find the time to train new team members and joiner engineers. Some of the solutions suggested by both teams were to develop training manuals that can help joiner staff with minimum disturbance to senior people. Another solution is to hire training consultants who can conduct in-house group training sessions for large group of people from several projects.
- Culture & language barriers: project team members constitute individuals from different countries across the world. Those people come from different cultures and speak different languages. The culture and language barrier becomes very dominant and impacted learning practices of those individuals.
- High employee turnover: both projects clearly suffered from high turnover rate. Project team A clearly attributed this to booming market conditions as well as lack of training and mentoring. Project team B also stated that heavy workloads are also a contributing factor to this high turnover. At the same time, both project teams agreed that some internal reasons are also contributing to this including: frustrations with work processes and corporate systems as well as financial reasons, personal career goals, etc.
- Lack of communication: clearly this is a major concern to both project teams. Project team A identified three levels at which the communication is missing; inter-disciplinary communication, cross-functional communication and communication across projects. Project team A attributed this lack of communication to heavy workloads and strict deadlines which does not give people sufficient time to communicate with their project team. However, it was also noted by project team B that this lack of communication is unintentional; it was either because people simply did not know what they need to communicate or not understanding the interface between different roles and the dependences of one job on the other.

B) Individual Learning: the following issues were noted in the two cases:

- Work in silos: it was noticed by both project teams that a major factor influencing the individual learning capabilities is the tendency to work in silos. As human beings people generally tends to work in isolation of each other and avoid interaction with other colleagues. Normally people from same department/ discipline (i.e. lines engineering, substation engineering, etc.) would form their own group and like to stick to each other.
- Resistance to change: among the individual barriers to the learning process is the resistance to change. People normally develop their own work patterns and habits based on their past experience and personal preferences. This is called the "comfort zone". Each individual builds his own comfort zone and likes to stick to it. When a new change is

introduced people are reluctant to accept it and break this confront zone and therefore, resist this change.

- Disengagement: it was clearly noticed on project A that joiner team members felt they are disengaged from the project and not informed with major changes happening on the project. This was a result of busy lead engineers and senior team members who can not find the time to update their subordinates with recent changes that are happening on the project. There were also insufficient meetings to engage the project team.
- Learning diary: when asked whether each member actually keeps a learning diary to document lessons-learned on a regular basis. Most of the individuals interviewed stated that they do not, although they admit that this is something useful. The main reasons for not keeping a learning diary were the lack of time and lack of incentives to document learning. Moreover, some project team members indicated that the repetitive nature of their job makes it unnecessary to document leaning as they are mostly doing the same thing over and over again.

C) *Group Learning: the following factors were related to the group learning aspect:*

- Reward & Retention: both project teams agreed that rewarding and retention mechanisms have to be put in place in order to encourage team members to learn as a group and communicate their learning in group settings. Some of the suggested mechanisms to enable that are: financial rewards, acknowledgement letters, career progression plans and promotions.
- PM leadership role: an important factor in fostering group learning is the leadership role that the project manager can play to build a cohesive team and align project team members together. The PM has a critical role in fostering this learning culture and encouraging team members to come forward with their learning and be open to discussions and accepting each other's opinions.
- Communication channels: there was clearly lack of communication on both projects. Project team B attributed this to scattered project team between two office buildings and suggested more project regular meetings and socializing among team members to break this barrier and facilitate exchange of information. Project team A attributed this lack of communication to the disengagement of team members and suggested several solutions to improve communication such as: small group discussions, storytelling, brainstorming sessions and socializing with the group.
- Lessons-learned sessions: both project teams agreed that they should be having lessons-learned sessions were team members get together at a certain stage of the project and start capturing and discussing lesson learned and draw on experiences from the project. Interviewees have indicated that these sessions have to be properly planned and executed in the sense that it should be topic specific with a specified agenda of items to be discussed. It has to be informal, everyone has the right to present his ideas and opinions freely without any criticism, and there should be a focus on active listening to those opinions and ideas by fellow project team members.

D) *Learning process: the following factors were associated with the learning process itself:*

- Movement of project team members: one of the barriers that impacts the development of a learning process is that project teams are often dismantled as soon as the project is completed and in so many cases some project team members even leave the project before completion due to shortage of resources and the need to deploy them in higher priority project. As a result, a learning opportunity is lost by the departure of a knowledgeable project team member to another project. The high turnover is also a contributing factor as some of those team members leave the organization to pursue other job opportunities. In other cases, project team members may also leave their position on the project due to their personal preference or even sometimes specific request by the client to replace certain project individuals.
- Reluctance to support lessons-learned: the in-depth investigation of this issue with both project teams indicated reluctance from senior management side to support lessons-learned initiatives. Both teams felt there is lack of incentive to support such activity due to the fact that both projects are based on cost plus (reimbursable) contracts. There is a hidden perception that more hours billed to the project means more profit achieved. So the idea of avoiding mistakes is not so attractive, as it tends to impact profitability at the end. There was also the feeling that this issue is a low priority on senior management's agenda due to lack of time and other commitments that are deemed more pressing. On the other hand, given the fact that both projects suffered severe shortage of resources, there will be no resources dedicated to the lessons-learned exercise. Heavy workloads also are contributing factor as it prevents team members from focusing on lessons-learned and distract their attention.
- Corporate culture: both project teams felt that corporate culture is not supportive to learning and does not create a suitable learning environment where people can freely share and communicate learning. Moreover, project team A indicated that there is lack of interaction between senior managers and project team members; so they felt that they are left alone and the joiner project team members felt that they are isolated from the rest of the organization.

The analysis of case A & B indicated a lot of similarities in the ideas and issues expressed by both project teams. There seem to be agreement between the two cases on the problems and challenges preventing learning improvement of project teams. However, the solutions and strategies that should be adopted by the organization to improve and foster learning on projects were somehow different between the two projects. In instances where there was a difference in the root causes of problems or the strategies suggested to deal with it, it was more due to the differences in opinions between certain individuals on project team A versus project team B or due to difference in project specific practices that were adopted by project managers on project A versus project B due to the nature and scope or size of the project.

Project Team Learning Framework

The research results originated from the two case studies suggest a conceptual framework for project team learning improvement that will facilitate the learning process and helps to enhance professional skills of project team members and improve knowledge sharing and communication across project teams. The main components of this conceptual framework include the following:

1) Individual learning improvement: the individual's capability to learn, ability to increase his knowledge level and develop his skill set is crucial to the overall learning improvement of project teams. Individuals are the basic building block of a project team; therefore, it becomes necessary to focus learning improvement efforts on the individuals who will form part of a project team working together towards common objectives. Among these strategies to improve individual learning is the following:

A. Implement a training strategy: It is suggested by interviewees that a training strategy has to be developed which will outline: training objectives, requirements, budget, timeframes, people to be trained, subjects, and evaluation criteria. This will motivate project team members to be involved in the project and improve their individual learning skills.

B. Awareness of Job interactions: it was noted by both project teams that part of the problem of lack of sharing of information or lessons-learned is not being aware of job interactions and dependences between project team members.

C. Develop career progression plans: among the issues noted by interviewees as a way to improve individual motivation is to develop career progression plans. Such plans will act as a road map for members of the project team to build their career according to a clear path knowing that they can progress in their career if they follow this path.

D. Support professional skills development: crucial to the improvement of individual learning skills, is to support professional development of project team members. Some of the strategies suggested by both project teams are: training courses that will help them in doing their job, attending conferences, technical workshops, etc.

E. Develop rotation programs: one of the ideas suggested by group of team members is to develop rotation programs for new hires and joiner team members during their probation period to enable them to understand the different functions and roles within the organization.

F. Encourage soft skills training for project managers: some interviewees noted that part of the problem faced on the project, is that project managers are so involved in the technical details of the project, and that they tend to focus and use more of the hard skills rather than the soft skills.

It was suggested by both project teams that project managers should work on improving their soft skills as well, which is not less needed on the project to help in creating a learning environment. Some of the soft skills that project managers need to improve are: leadership skills, coordination, delegation communication, and public speaking.

2) Group learning improvement: an important aspect to project team learning is how the team develops and improves their learning skills collectively working together as one group. It was noted by almost all of the project team members' interviewed that learning together in a group setting is an essential component to develop learning capabilities and skills that will help them avoid repeating mistakes and improve performance. Some of the suggested strategies to improve group learning are:

A. **Socializing:** socializing is the process whereby project team members socially interact and engage with each other outside working hours and in which they discuss non-work related issues. Such process was highly recommended by both project teams and was emphasized by the majority of the interviewees in several occasions. Some of the socializing activities recommended include: lunch out, coffee breaks, celebrations, company social events, etc.

B. **Brainstorming:** due to heavy workloads and busy team members, there was no formal gathering of team members to exchange ideas, and generate solutions to specific problems. When asked about this, the majority of project team members agreed that such sessions were project team members get together at the end of the project or at the end of a major phase of the project is very helpful to the entire team.

C. **Team building sessions:** team building is an important socializing activity where project team members get together and work on a group exercise or little project that is non work related. This exercise helps to develop social relations between member of the team and bridge the gap that exist between those members, therefore, facilitate exchange and sharing of knowledge and lessons-learned among the team. Such lessons will also help building on existing knowledge, expanding learning capabilities by listening to other opinions and ideas and listening to stories from other members on the team.

D. **Encourage participation and active listening:** it was seen as important by interviewees, for team leaders and project managers to encourage participation in group meetings, discussions and social events as well as active listening to suggestions, ideas and other team member's opinions. Participation and listening are a systematic way of building on existing knowledge and challenging assumptions through two-way conversation with other project team members.

3) **Organizational learning improvement:** the third dimension of project team learning is the organizational learning improvement which represents the corporate related processes and tools that needs to be adjusted to create a learning culture and a suitable environment for learning to evolve and spread beyond the boundaries of the project team to other organizational departments, functional groups and other project teams. Among the strategies that will lead to organizational learning improvement as suggested by both project teams are the following:

A. **Create clear lines of accountability:** it was noted by some interviewees on both projects A & B that among the issues that prevent early detection of problems and possible mistakes, are unclear lines of accountability among members of the project team working within different functional groups. It was recommended by interviewees that the lines of accountability and the exact job responsibilities should be clearly defined at the beginning of the project and each member should be fully aware of his role and responsibility.

B. **Improve work processes and procedures:** this issue was clearly a major challenge for the entire organization from all perspectives. It was noted by interviewees on both projects A & B that current work processes and procedures are not adaptive to learning and inefficient in many areas.

C. Develop a formal lessons learned process: Formal lessons learned process framework should be developed with detailed work procedure that should align with the corporate business process. Dedicated lessons learned team should be appointed. Some interviewees suggested that the quality department should take ownership of this process, as lessons-learned aim to improve quality and performance at the end.

D. Develop reward and retention programs: it was recommended by both project teams A & B that senior management should encourage rewarding of distinguished project team member to motivate them to learn and communicate lessons-learned. Among the rewarding mechanisms suggested are: financial rewards (i.e. bonus), acknowledgement letters, promotions, little recognition gifts, etc.

E. Create a learning culture: it was obvious to the author through these case studies that the current culture within this organization does not truly support learning initiative and does not encourage practices that will lead to individual and group learning improvement across the organization.

F. Identify subject matter experts: an important aspect of developing a lessons-learned process is to identify knowledge experts in certain fields of the industry (i.e. telecommunication equipment, protection & control, optical cables, etc.) who are professional in their field and have experience that will enable them to act as technical advisors or lessons learned owners. The identification of such experts assigned to each lessons-learned helps project team members to locate who knows what and contact those experts if they require additional clarifications or more details on how to implement certain lessons on their project. The table below highlights the key components of the learning framework.

Figure 1.
Project Team Learning Framework

Improvement Levels	Actions & Strategies	Expected Results	Ultimate Objective
Individual Learning Improvement	<ul style="list-style-type: none"> - Raise awareness of job interactions - Develop career progression plans - Develop rotation programs - Encourage soft skills training for project managers - Invest in training & mentorship - Develop corporate resources 	Professional Skills Development	<p>Improved</p> <p>Project</p>
Group Learning Improvement	<ul style="list-style-type: none"> - Socialization - Brainstorming - Team building sessions - Participation and active listening 	Improved Knowledge Sharing and Communication	<p>Team</p> <p>Learning</p>
Organizational Learning Improvement	<ul style="list-style-type: none"> - Create learning culture - Create clear lines of accountability - Develop a formal lessons-learned process and database - Develop reward and recognition programs - Identify subject matter experts - Develop training manuals - Create a shared vision 	Adaptable work processes and corporate tools	

Conclusions

The introduction of a lessons-learned process in an organization has to be approached carefully. Proper upfront planning has to precede this. It is a process that should be highly customized to suit a specific organization depending on its practices and internal processes. An overall process model or framework will only serve as a guideline as there will be no “one size fits all” solution.

The group learning dimension is obviously missing in both cases and is the immediate challenges that organizations should focus on to improve project team learning. There should be more focus on social relations between members of the team as well as improving communicative learning by adopting some of the strategies discussed in this paper. The end result of group learning would be improvement in knowledge sharing and communication across the whole organization.

Moving from individual learning level to the group learning level is a big challenge. However, if the organization wants to become a learning organization. The next level of improvement should be the organizational learning improvement. This is a big change to current organization's norms and practices that will take long time and extensive effort to implement. Organizations should aim at improving work processes and corporate information technology systems and tools to make it adaptive to learning. This step is also critical if the organization wants to make significant improvement on the transfer of lessons-learned across projects, departments and other functional groups.

A curtail part of project learning is the development of a lessons-learned process. The normal practice on projects is to conduct lesson-learned at the end of the project. It was concluded from this study that this is not a practical and useful approach due to two reasons. Firstly, the project team is so transient and dynamic that by the time they reach the project closure phase, the whole team is dismantled and the learning opportunity is lost. Secondly, and especially on large projects, people tends to forget learning if it was not instantly captured and properly documented. Organizations should implement a lessons-learned process that starts with the early planning phase of the project and moves parallel with the corporate business process to ensure timely capture and dissemination of lessons-learned to everyone on the project team.

In summary, the findings of this study revealed new and interesting facts about the nature of learning in projects and the associated challenges. However, a limitation to this study remains the fact that it is conducted only within one organization and was applied only on two projects which makes it difficult to generalize outside the domain of similar organization and in industries similar to the utility industry.

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